A1 concl'd.

March 23, 2000, Serial No. 60/192,444 filed March 24, 2000, Serial No. 60/192,443 filed March 27, 2000, Serial No. 60/192,441 filed March 27, 2000, Serial No. 60/192,440 filed March 27, 2000, and Serial No. 60/192,442 filed March 27, 2000, Serial No. 60/192,953 filed March 29, 2000, Serial No. 60/192,948 filed March 29, 2000, Serial No. 60/192,949 filed March 29, 2000, all incorporated herein by reference.

In the Claims

Please add the following new claims:

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19. (New) A semitransparent optical detector comprising:
a PIN diode having amorphous silicon P and N layers; and
an intrinsic I layer of an alloy of silicon and germanium.

20. (New) The detector of claim 19 on a transparent substrate.

21. (New) The detector of claim 20 wherein the substrate is glass.

22. (New) The detector of claim 20 wherein the substrate is a polymer.

23. (New) The detector of claim 20 wherein the substrate is silicon which is transparent at a wavelength greater than about 1100 nm.

24. (New) The detector of claim 19, wherein the concentration of germanium in the I layer is graded from a relatively low concentration adjacent the P and N layers to a relatively high concentration in the interior of the I layer.

25. (New) A method of making a semitransparent optical detector, comprising:
providing a transparent substrate;
depositing a transparent conductive layer on the substrate;
vacuum depositing at an elevated temperature a relatively thin P layer of doped amorphous silicon on the conductive layer;

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providing germanium in a form of a GeH_4 gas component of a chemical vapor deposition gas;

vacuum depositing at an elevated temperature a relatively thick I layer of an amorphous alloy of silicon and germanium using the chemical vapor deposition gas;

vacuum depositing at an elevated temperature a relatively thin N layer of doped amorphous silicon on the conductive layer; and

depositing a transparent conductive layer on the N layer.

26. (New) The method of claim 25, further comprising:

doping the P layer with boron.

27. (New) The method of claim 25, further comprising:

doping the N layer with phosphorous.

28. (New) The method of claim 25, further comprising:

bonding the substrate to a vertical cavity surface emitting laser (VCSEL) device.

29. (New) The method of claim 25, wherein the substrate is a layer of a vertical cavity surface emitting laser (VCSEL) device.

30. (New) The method of claim 25, further comprising:

integrating the substrate in a package for a laser device, in a light path of the laser.

31. (New) The method of claim 25, further comprising:

varying a concentration of GeH_4 gas in the chemical vapor deposition gas to vary introduction of germanium into the alloy from a relatively low concentration for deposition at a boundary with the P layer, to a high concentration for deposition within the I layer, and to a relatively low concentration for deposition at a boundary with the N layer.

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32. (New) The method of claim 31, wherein the low concentration of GeH_4 gas is about 0% of the chemical vapor deposition gas and the high concentration of GeH_4 gas is selected to optimize photon absorption at a wavelength of interest.

33. (New) The method of claim 31, wherein the low concentration of GeH_4 gas is about 0% of the chemical vapor deposition gas and the high concentration of GeH_4 gas is about 100% of the chemical vapor deposition gas.

34. (New) A semitransparent optical detector comprising:

a PIN diode; and

a transparent thin film conductor at least partly covering and contacting a surface of the PIN diode.

35. (New) The detector of claim 34, wherein the transparent thin film conductor is ZnO.

36. (New) The detector of claim 34, wherein the transparent thin film conductor is SnO.

37. (New) The detector of claim 34, wherein the transparent thin film conductor is indium tin oxide.

38. (New) The detector of claim 34, further comprising:

a substrate on which the transparent thin film conductor is disposed, at least partly between the PIN diode and the substrate.

39. (New) A method of making a semitransparent optical detector comprising:

providing a transparent substrate;

sputtering a transparent thin film conductor onto the substrate; and

forming a PIN diode on the transparent thin film conductor and the substrate.

40. (New) The method of claim 39, wherein sputtering further comprises:

sputtering ZnO.

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41. (New) The method of claim 39, wherein sputtering further comprises:
sputtering SnO.

42. (New) The method of claim 39, wherein sputtering further comprises sputtering indium tin oxide.

43. (New) A semitransparent optical detector comprising:

a thin film PIN diode;

a first transparent conductor at least partly covering and contacting a first surface of the PIN diode;

a second transparent conductor at least partly covering and contacting a second surface of the PIN diode; and

a passivation layer covering and enclosing all edges of the PIN diode, defining an aperture on one surface thereof, and exposing a part of the second transparent conductor for contact thereto.

44. (New) The detector of claim 43, the passivation layer having a hole defined therethrough, through which contact is made with the second transparent conductor.

45. (New) The detector of claim 43, further comprising:

a patterned metal layer over the passivation layer, including a first conductor entering the aperture to contact the first transparent conductor and a second conductor contacting the second transparent conductor.

46. (New) The detector of claim 45, wherein the second conductor contacts the second transparent conductor through a hole defined in the passivation layer.

47. (New) The detector of claim 43, wherein the first transparent conductor extends partly over the passivation layer, the detector further comprising:

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a patterned metal layer over the passivation layer, including a first conductor contacting the first transparent conductor without entering the aperture and a second conductor contacting the second transparent conductor.

48. (New) The detector of claim 47, wherein the second conductor contacts the second transparent conductor through a hole defined in the passivation layer.

49. (New) The detector of claims 45 or 47, wherein the thin film PIN diode extends to a contact pad position and the first conductor defines a path on the surface of the PIN diode to the contact pad position.

50. (New) The detector of claim 49, wherein the a region contacted by at least one of the first and second transparent conductors defines a limited active area less than all of the PIN diode.

51. (New) The detector of claims 45 or 47, wherein the PIN diode has tapered edges, a top surface of the PIN diode having a smaller area than a bottom surface thereof.

52. (New) The detector of claim 43, wherein the passivation layer is silicon nitride.

53. (New) The detector of claim 43, wherein the passivation layer is silicon dioxide.

54. (New) A method of monitoring an optical beam, comprising:

interposing a transparent photodetector in the optical beam between a light source and a light receiver; and

measuring an output of the photodetector.

55. (New) The method of claim 54, further comprising:

controlling the light source responsive to the measured output of the photodetector.

56. (New) A small aperture semitransparent optical detector, comprising, in the order stated:

a first conductive layer;

a PIN diode having a first edge partially overlying the first conductive layer;

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a passivation layer covering and enclosing all edges of the PIN diode and defining an aperture on a surface of the PIN diode; and

a second conductive layer contacting the surface of the PIN diode through the aperture.

57. (New) The detector of claim 56, wherein the second conductive layer is a transparent conductor covering the aperture, the detector further comprising:

a third conductive layer contacting the transparent conductor outside the aperture.

58. (New) The detector of claim 56, wherein the second conductive layer contacts the surface of the PIN diode near a second edge diagonally opposite the first edge.

59. (New) A connection system for a semitransparent optical detector having an aperture, comprising:

a bottom conductor which, in plan view, substantially surrounds the top conductor;

a top conductor which surrounds the aperture and defines a hole therethrough aligned with the aperture; and

a bottom conductor which surrounds the aperture and defines a hole therethrough aligned with the aperture.

60. (New) The detector of claim 59, wherein the bottom conductor, in plan view, substantially surrounds the top conductor.

61. (New) A method of making a small aperture semitransparent optical detector on a substrate, comprising:

depositing and patterning a PIN diode on the substrate;

depositing and patterning a passivating layer covering and enclosing all edges of the PIN diode and defining an aperture on a surface of the PIN diode; and

depositing and patterning a first conductive layer.